

Toshiba and Smart Metering

Exploring Smarter Networks: Experts and Interested Parties Initial Meeting, Western Power Distribution

Professor Joe McGeehan

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Overview

- **Toshiba Background**
- **Smart Grid/Smart Metering Background**
 - What are they and why do we need them?
 - Motivations
- **Current Standardisation Activities**
- **Summary**

Smart Grid News

Toshiba Wins Order to Supply Okinawa Smart Grid Trial

Jan 2010

- Build Next-gen Electric Power System in Japan (\$55 million)
- Project to use solar panels and rechargeable batteries in Miyako Island.

Toshiba partners with two companies to commercialize smart meters

Jul 2009

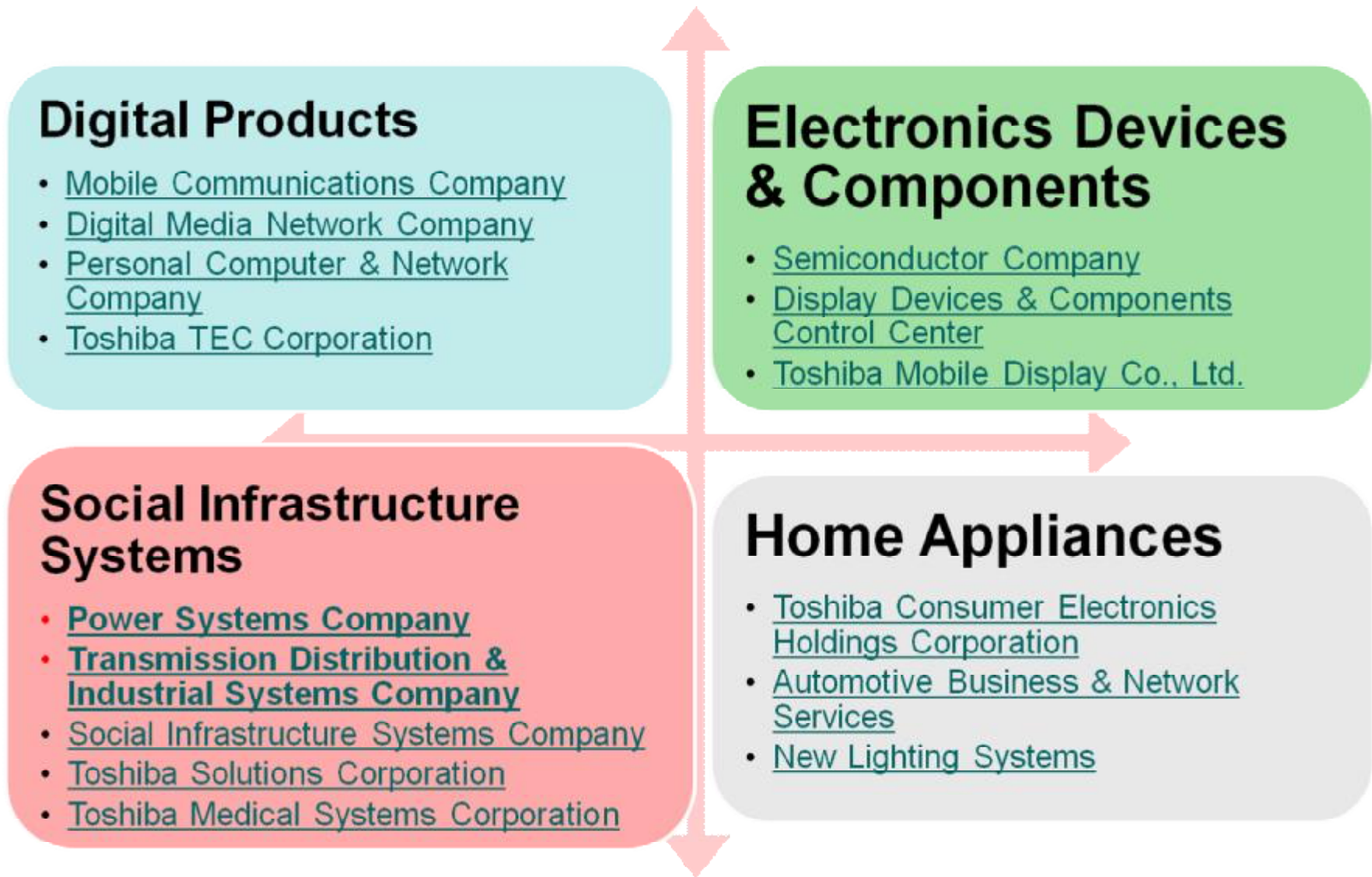
- Toshiba smart meter with advanced features in mind, such as data communication & household electrical appliance control functions.

Toshiba (as part of a consortium of Japanese companies) pledges up to \$30m for New Mexico smart grid

Jun 2009

“**Toshiba** aims to expand its energy operations to transmission equipment as countries such as the U.S. and the U.K. invest in upgrades of their electrical systems”.

Toshiba Business Domains



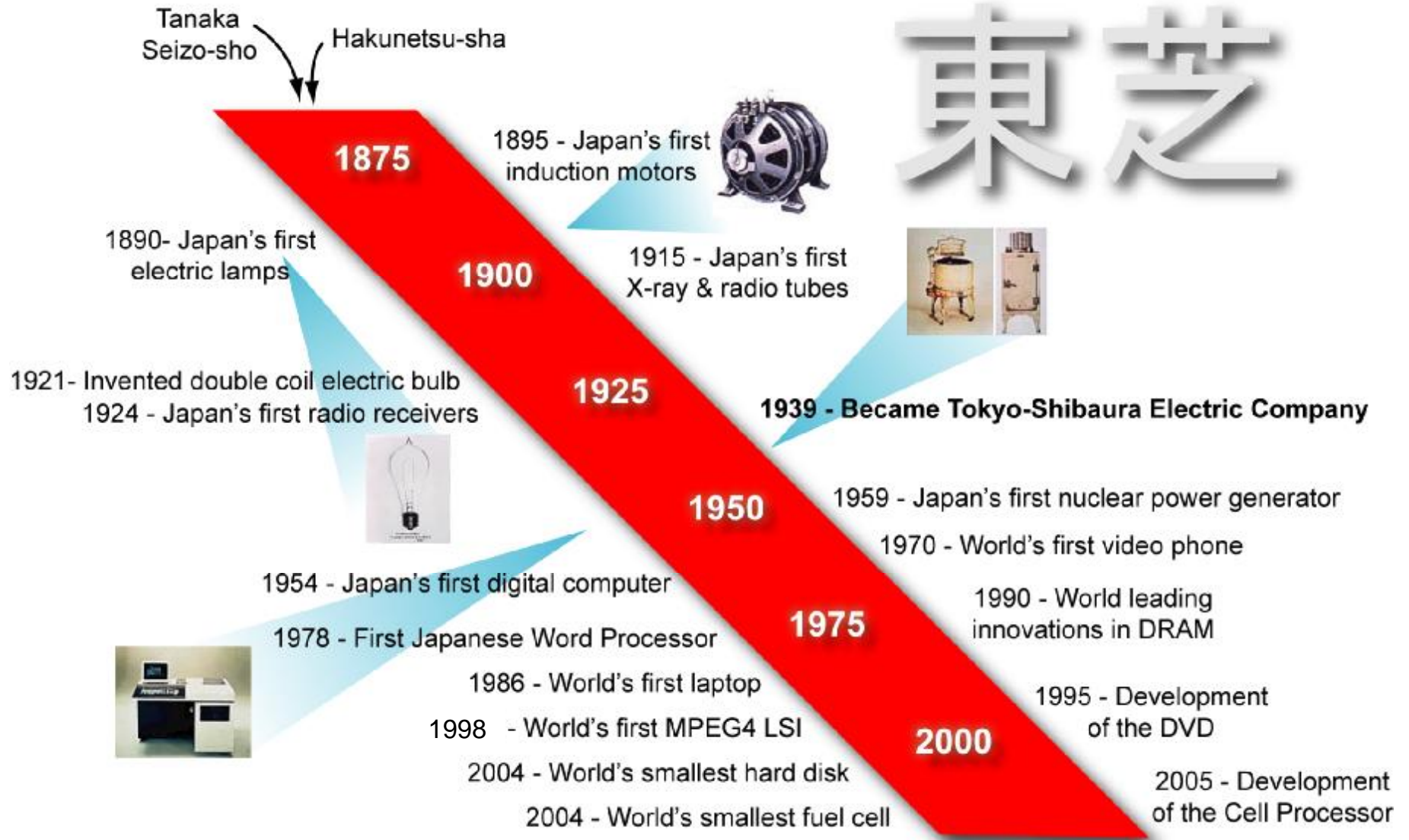
Toshiba – some figures

- **One of the world's largest integrated manufacturers of electric and electronic equipment**
 - World-wide annual sales of over \$60 billion (USD)
 - Over 200,000 employees
 - Diverse portfolio

- **Annual R&D expenditure of over \$4.2 billion**
 - Fundamental research mated to clear business requirement
 - 13,000 R&D staff in business units
 - 1,500 researchers in corporate R&D centre

Toshiba: History of innovation

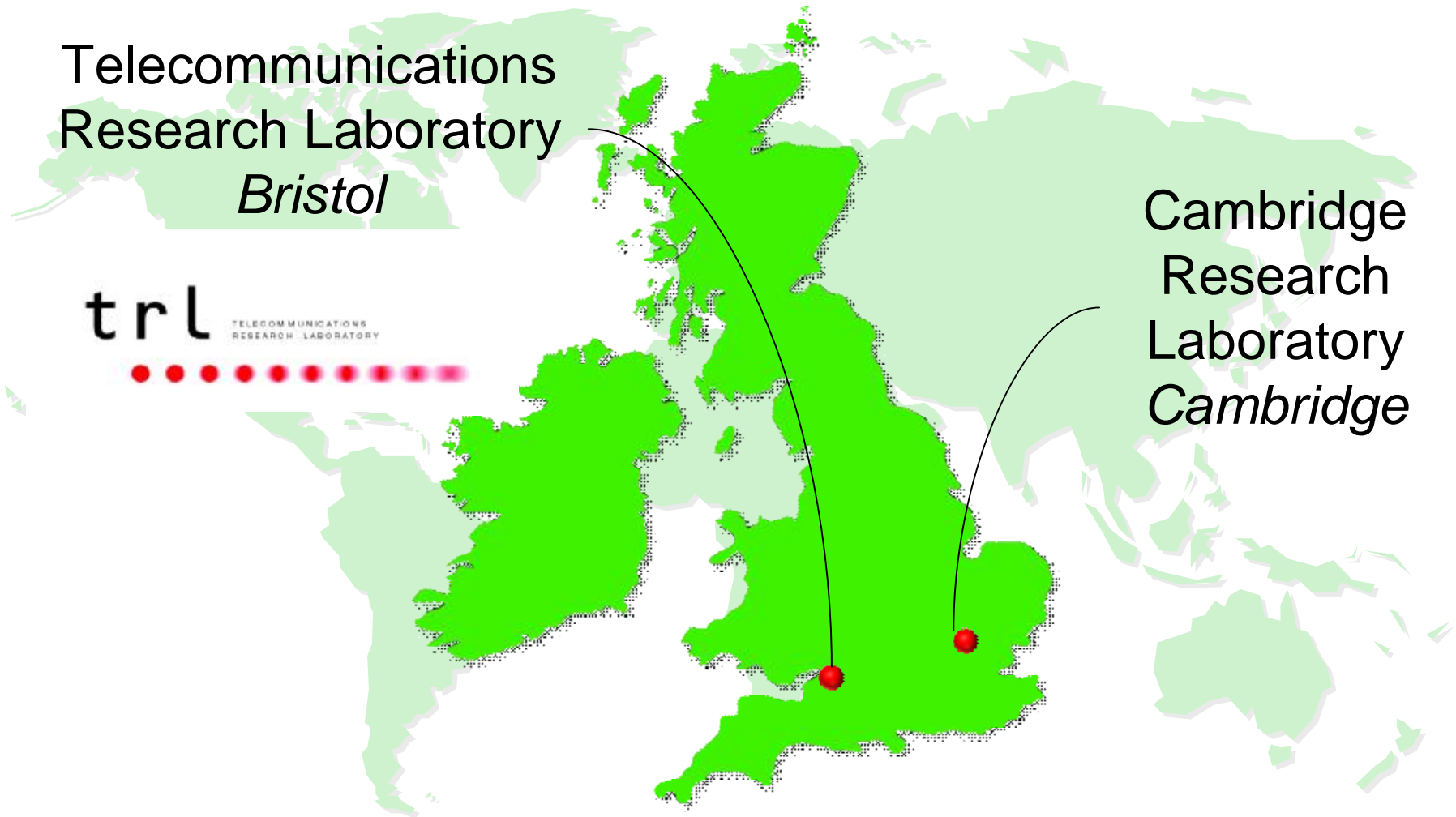
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Global R&D



Toshiba Research Europe Ltd (TREL)



Funded by Toshiba's Corporate R&D Centre, Kawasaki, Japan.

Background - Definitions

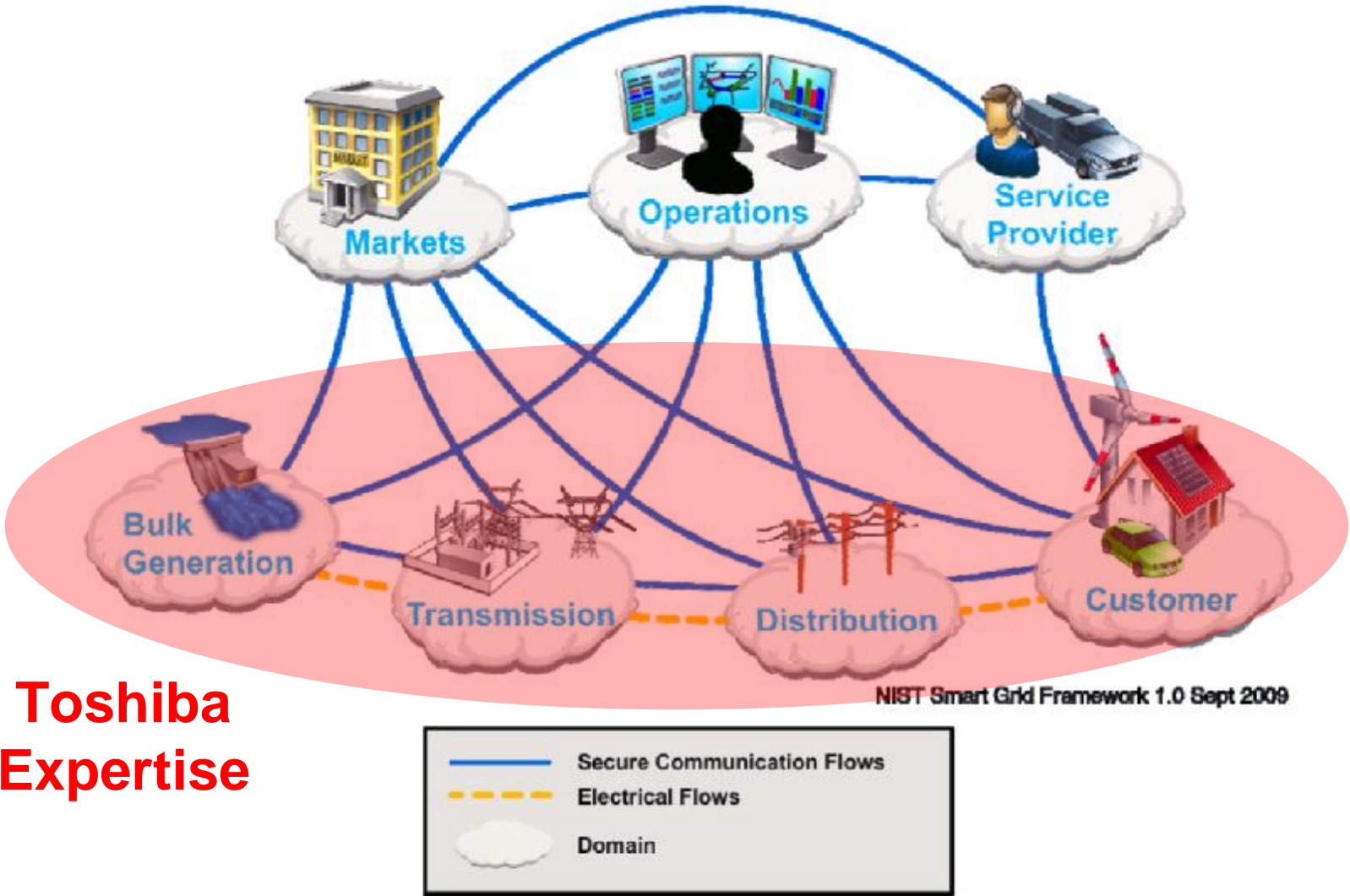
- **Smart Grids**

- An electricity network that can intelligently integrate the actions of all users connected to it
 - E.g. Generators, consumers, and those that do both
- Characterised by the two-way flow of both electrical energy and data associated with it

- **Smart Meters**

- An advanced meter that measures energy consumption in much more detail than a conventional meter
 - Usually electrical, but can also integrate or work together with gas, water and heat meters

Background – Conceptual Models



Smart Grids in Europe - Overview

- **Highly-interconnected, meshed network already exists**
- **Biggest concern is the integration of renewable energy provision to meet the 2020 targets for carbon reduction**
- **A very ‘planned’ approach to the implementation of smart grid and smart metering technologies in the medium to long term**
- **Current priorities:**
 - Standardisation
 - University research projects
 - Demonstration projects
 - Above project in cooperation with utilities and manufacturers

Smart Grids in Europe – Key Challenges (1)

- **As laid out in the Strategic Deployment Document for Europe's Electricity Networks of the Future:**
 - **Strengthening the grid**
 - ensuring that there is sufficient transmission capacity to interconnect energy resources, especially renewable resources, across Europe
 - **Moving offshore**
 - developing the most efficient connections for offshore wind farms and for other marine technologies
 - **Developing decentralized architectures**
 - enabling smaller scale electricity supply systems to operate harmoniously with the total system
 - **Communications**
 - delivering the communications infrastructure to allow potentially millions of parties to operate and trade in the single market
 - Move from 4 meter readings per year to a few *thousand*

Smart Grids in Europe – Key Challenges (2)

- **Active demand side**
 - enabling all consumers, with or without their own generation, to play an active role in the operation of the system
- **Integrating intermittent generation**
 - finding the best ways of integrating intermittent generation including residential micro generation
- **Enhanced intelligence** of generation, demand and most notably in the grid
- **Capturing the benefits of DG** (Distributed Generation) and storage
- **Preparing for electric vehicles**
 - whereas Smart Grids must accommodate the needs of all consumers, electric vehicles are particularly emphasized due to their mobile and highly dispersed character and possible massive deployment in the next years, what would yield a major challenge for future electricity networks.

Standardisation – Mandate M/441 EN

- **Issued by the European Commission in March 2009**

- *“...to create European standards that will enable interoperability of utility meters (water, gas, electricity, heat), which can then improve the means by which customers’ awareness of actual consumption can be raised in order to allow timely adaptation to their demands (commonly referred to as ‘smart metering’).”*

- **Timescales:**

- European standard for communication by March 2010
- Harmonised solution for ‘Additional Functionalities’ by December 2011
- Combined progress report from relevant ESOs (European Standardisation Bodies) by October 2010

Standardisation - Interoperability

- **Biggest difference between conventional power grids and smart grids is that smart grids will incorporate a heavy dose of communications**
 - Bi-directional communications (and energy transfer)
 - Larger number of devices and entities
 - Smart Meters
 - User load controls
 - User distributed energy source control (i.e. Micro-generation at the home)
 - Home network and energy control
 - Power distribution equipment
 - Supply and demand control software
 - Large scale power source control (i.e. power stations)
 - Billing and service provisioning infrastructure
- **The key is INTEROPERABILITY**

Standardisation – Relevant Bodies



European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für elektrotechnische Normung



European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung



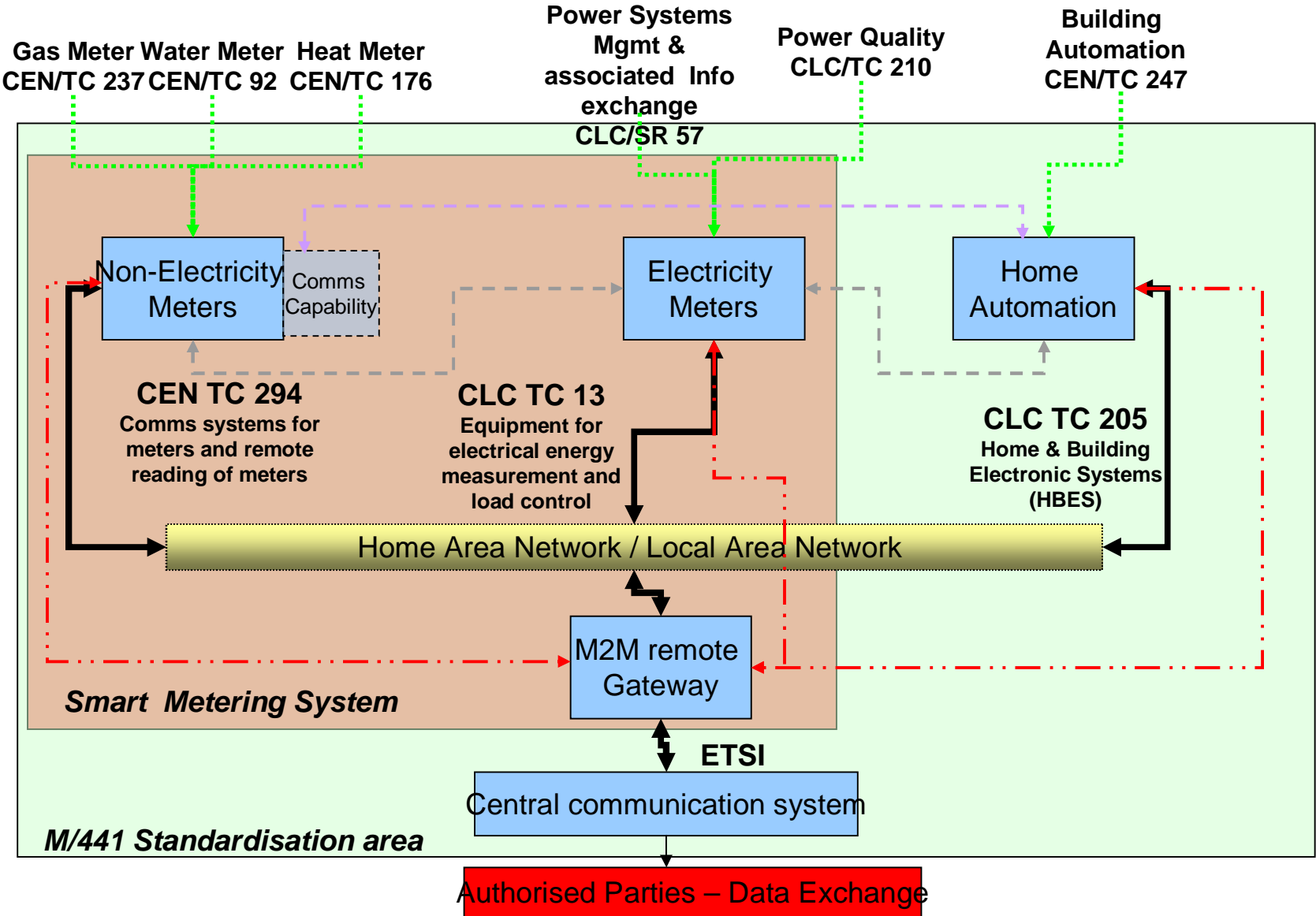
Commission Electrotechnique Internationale
International Electrotechnical Commission
МеждународнаяЭлектротехническаяКомиссия



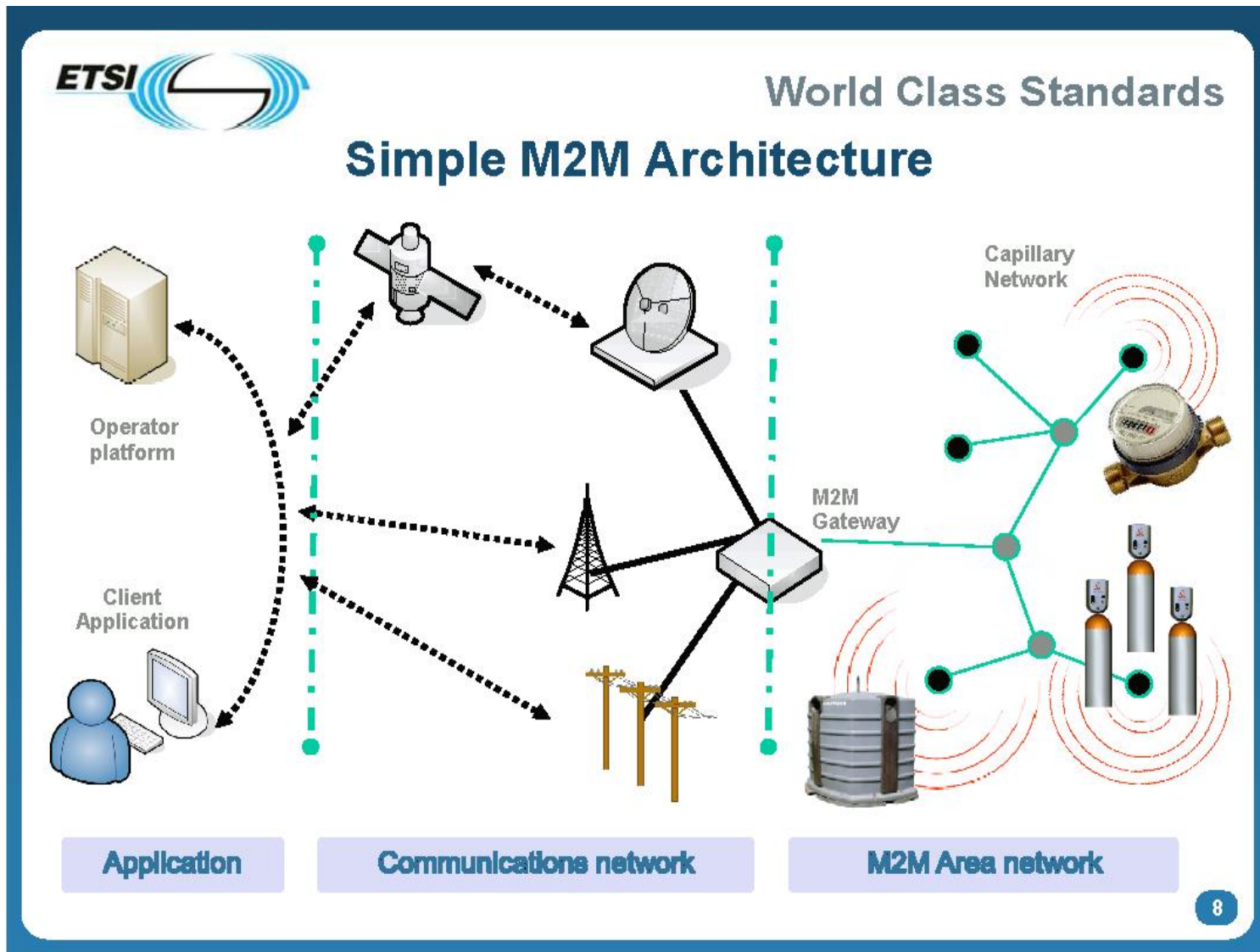
Although not a standardisation body, ESMIG is nevertheless influential in the area of smart metering in Europe and many of the members are active in the standardisation process



Standardisation – SM-CG Recommendations

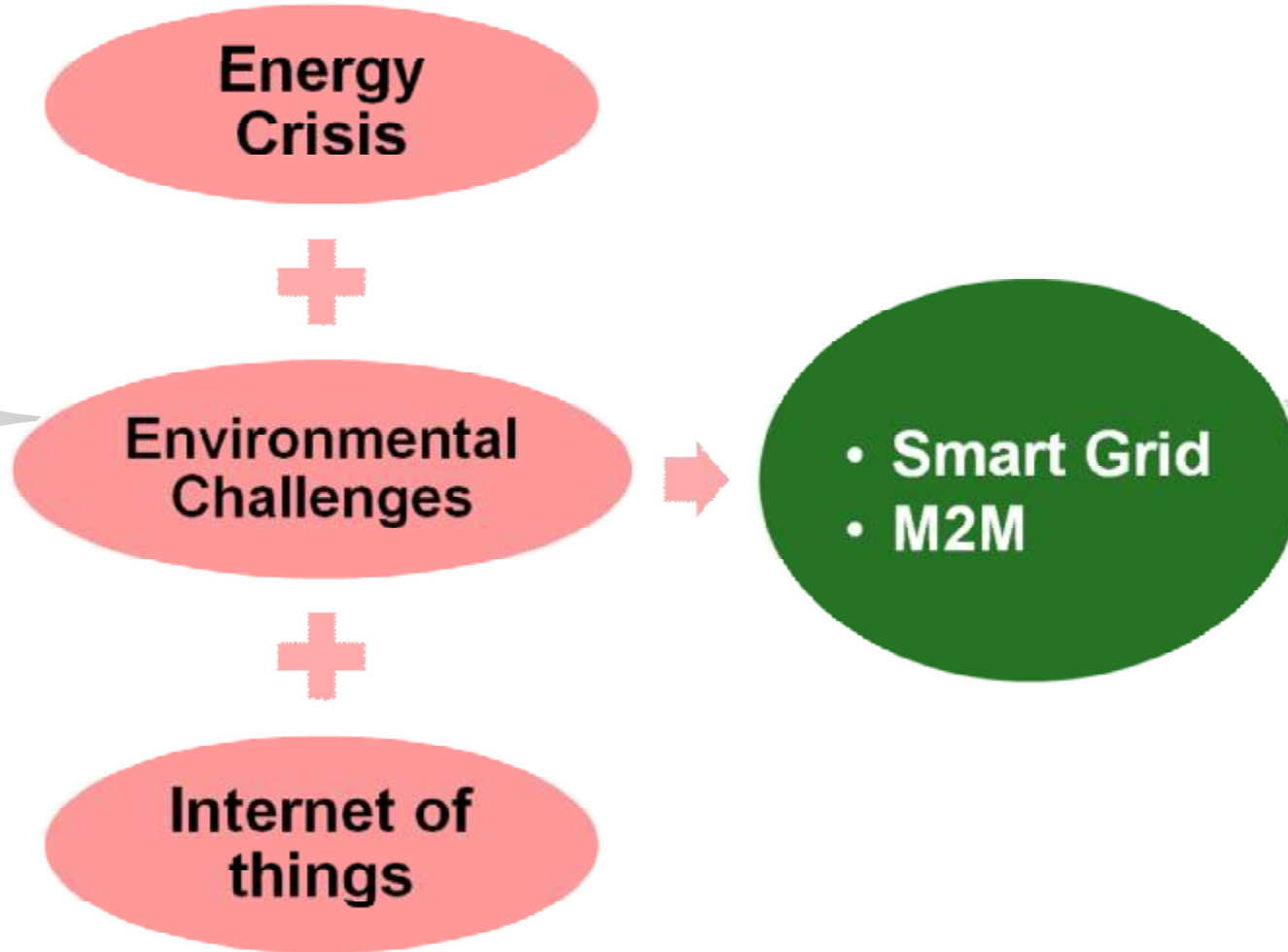


Standardisation – ETSI M2M Architecture



Challenges and Opportunities

Social, Political, Economic, Environmental & Technical Issues
That Affect Us All



Business and Research Opportunities for
Energy and ICT sector

Summary

- **Toshiba has a long history of diversity and infrastructure provision**
- **Toshiba has expertise across the board of smart grids and smart metering**
 - Toshiba is one of perhaps only a small handful of companies that encompasses so many diverse technologies that will be related through Smart Grid initiatives
- **Important areas and activity**
 - APIs/Interfaces for interoperability and security, system modelling and performance analysis
- **Smart grid challenges across Europe**
 - Millions of meter readings every day!
- **Standards – Toshiba has expertise and interest in all of the areas covered by the M/441 mandate**

TOSHIBA

Leading Innovation >>>